ing the sclerotised and membranous parts. With *Eupista* this normally takes three to five minutes, but takes longer for larger specimens. The caustic solution may be heated in a watch-glass over a water-bath or in a test-tube in a beaker of water. Then transfer the abdomen to acetic acid. While in the acid the scales may be scraped gently off the abdomen with a needle and the genitalia drawn out of the terminal abdominal segments into which they often are retracted. It is most convenient to have the acid in a watch-glass or, better, in the cavity of a hollow-ground slide. After a few minutes in the acid, transfer the genitalia to a drop of Faure's Medium on a slide, arrange in position, and apply a coverglass. The advantages of this method are that a large number of preparations may be made in a relatively short time; while one specimen is in the caustic another is in the acid and a third is being mounted on a slide, that it is not necessary to dehydrate when using Faure's, the specimen being mounted directly from the acid, and that the Faure's keeps the genitalia soft so that they may be removed and dissected or remounted months or even years afterwards.

Explanation of Plate.—Genitalia of the *Juncus*-feeding species of *Eupista*: figs. 1-5 males, ventral views with valvae outspread; figs. 6-10 males, lateral views with valvae in normal closed position; figs. 11-15 females, ventral views.

THE GENETICS OF CROCALLIS ELINGUARIA, L., AB. FASCIATA, GILLMER, AB. BREVIPENNIS, AB. NOV., AND AB. UNICOLOR, PROUT.

By E. A. Cockayne, D.M., F.R.C.P., F.R.E.S.

In addition to his extensive breeding experiments with *Angerona prunaria*, L., the late Dr H. D. Smart bred *Crocallis elinguaria* for three years, using as stock the offspring of three females obtained in Skye, which he called broods A, B, and C.

Brood A consists of ab. *fasciata*, which are as fine as any I have seen. The ground colour is free from speckling and more orange than the straw colour of typical specimens (light orange yellow, Ridgway) with a rich brown median band (Sayal brown, Ridgway) and very dark antemedian and postmedian lines in the males. The median area in the females is not as brown, but the lines are as distinct.

Brood B. The ground colour in all the males has brown scales mixed with the paler ones, producing a colour near warm buff, Ridgway, and the band is a little darker than the ground with a paler line on its inner and outer aspect. Seven are darker (tawny olive, Ridgway), and in one of them the band is very dark. The females are paler, one being intermediate between pale orange yellow and light orange yellow, Ridgway, others paler buff than the males.

Brood C. Both sexes vary from pale orange yellow to light orange yellow with the median area in one male and two females almost the same colour as the ground colour, others with it darker, but in none is it as dark as in ab. *fasciata* nor are the ante- and postmedian lines as dark.

Brood D closely resembles Brood C in all respects.

Brood E. One male is like the intermediates of C, and four are as dark a brown as the darkest males of B (tawny olive, Ridgway). The females have rather more speckling than those of B and are, therefore, browner and less orange. In the brownest, a male and two females, the dark lines are very distinct.

Brood F are all ab. *fasciata* like Brood A.

Brood G. There are five males with brown speckling on the ground colour like those of E and three males are dark brown (tawny olive); two females are light orange yellow and four are warm buff. Two males are light orange yellow with the transverse lines as dark as in ab. *fasciata*, and one male is ab. *fasciata* like those of Brood A.

Brood H. One female is warm buff and one has the median area darker than the ground colour, like the darkest in C and D. One male has the ground colour darker brown than any in those broods.

Brood J. All are ab. *fasciata* and are under-sized, but the females have the median area as dark as the darkest males in A or F. The ground colour is warm buff.

Brood K are all ab. *fasciata*, but in one male the band is not as dark as in males of Brood A. The females have the dark ante- and post-median lines of ab. *fasciata*, but the median area is not as dark as in A.

Unfortunately Dr Smart did not keep the parents of his broods, nor does he state their full numbers. It is evident that the specimens he kept are representative samples of each brood, but it is not safe to assume that the various forms are represented in the correct ratios.

I give the numbers and sexes of the samples of each brood with Dr Smart's brood numbers, but the conclusions drawn from his results are my own. Assumptions are made, which would have been unnecessary, if he had kept complete data.

Brood A (parentage unknown), 1938. 16 ab. *fasciata*, 8 ♂, 8 ♀.
Brood F (A × A), F_1 gen., 1939. 16 ab. *fasciata*, 8 ♂, 8 ♀.
Brood J (F × F), F_2 gen., 1940. 12 ab. *fasciata*, 6 ♂, 6 ♀.
Brood B (parentage unknown), 1938. 16 variable, no ab. *fasciata*, 8 ♂, 8 ♀.
Brood C (parentage unknown), 1938. 16 variable, no ab. *fasciata*, 8 ♂, 8 ♀.
Brood D (A × C), F_1 gen., 1939. 16, 9 normal, 6 ♂, 3 ♀, no ab. *fasciata*, 7 examples of a new form, which I am naming ab. *brevipennis*, 4 ♂, 3 ♀.
Brood H (D × D), F_2 gen., 1940. 10, normal 6 ♂, 2 ♀, 2 ab. *brevipennis*, 1 ♂, 1 ♀.
Brood G (A × B), F_1 gen., 1939. 14, number of ab. *fasciata* doubtful, 8 ♂, 6 ♀.
Brood K (G × G), F_2 gen., 1940. 14, all ab. *fasciata*, 8 ♂, 6 ♀.

Broods A, F, and J show that Dr Smart probably had ab. *fasciata* in a homozygous state, and Brood D, a cross between a normal moth and a *fasciata* yielding all normal moths, proves that *fasciata* is recessive. Brood G, another cross between a normal moth and a *fasciata*, gave one very fine *fasciata*, two poor ones, and five dark brown moths, two of which may be *fasciata*, for the band is as dark as in *fasciata* of Brood A. Thus the ratio of normal to *fasciata* is uncertain, but may

have been 1 : 1, the result expected by crossing a moth homozygous for *fasciata* with one heterozygous for it. Presumably both parents of Brood K were *fasciata*, for all the progeny are exceptionally fine examples of this aberration.

Brood D produced a form not represented in the samples of Broods A and C, and since it is a striking form, one may assume that none were present in either of these broods. It is probably recessive, but the ratio in the sample is 9 normal to 7 *brevipennis*, instead of 3 : 1. I suspect that all the *brevipennis* were kept and many normal ones rejected. The parents of Brood H were probably normal in appearance, but heterozygous for the *brevipennis* character, but in the sample the ratio of normal to *brevipennis* is 5 : 1 instead of 3 : 1. This may be a complete brood, and, if so, the ratio is not far from that expected, allowing for the small size of the brood. If the brood is incomplete it is surprising that there are not more *brevipennis*. I think there can be little doubt that *brevipennis* is recessive to normal shape and pattern, and that ab. *fasciata* is recessive to the typical form.

Ab. **brevipennis**, ab. nov. The costa is shortened, accentuating the concavity of the termen (the length of the forewing from base to apex in two males and two females being 15 mm., 15 mm., 15 mm., and 16 mm. respectively, and the distance from apex to anal angle 11.5 mm., 12 mm., 12.5 mm., and 13 mm., compared with 17 mm., 17.5 mm. from base to apex and 11 mm. and 12.5 mm. from apex to anal angle in a normal male and female of the same brood). The discoidal spot is large and very close to the postmedian line, which curves inwards to an unusual extent as it approaches the inner margin (the distance between the antemedian and postmedian lines is 8 mm. at the costa and 1.5 mm. at the inner margin, compared with 9 mm. and 4 mm. respectively in average specimens of the same brood). In this respect it resembles ab. *obviaria*, Ljungdahl. (*signatipennis*, Newstead and Smith), though the lines do not meet as in this aberration. The moths in spite of their short wings are not undersized, their bodies being as large as those of the normal members of the brood. All have nervure 8 missing in both forewings.

Type, 1 ♀, Skye, 1939. Bred by H. D. Smart.
Paratypes, 4 ♂, 2 ♀, Skye, 1939. 1 ♂, 1 ♀, Skye, 1940.

In 1942 Mr R. C. R. Crewdson sent me some pupae from the Black Wood, Rannoch, and from them I bred various forms including two ab. *unicolor*, Prout, both on the same day. I obtained a pairing and in 1943 bred 41, all *unicolor*, 21 ♂, 18 ♀, and 2 of which the sex was not noted. I obtained a pairing, but the eggs hatched a month earlier than those of the previous year, and few larvae survived. The 5 bred, 2 ♂ and 3 ♀, were all *unicolor*. Prout gives a very brief description of ab. *unicolor*, but as it was his custom to take figures in Barrett's work as types, there is little doubt that Plate 293, fig. 1e, is the type of ab. *unicolor*. Two of my males match it exactly, but the majority are slightly more buff coloured. In both sexes the median area is the same colour as the rest of the wing and there are no dark ante- and postmedian lines. In the males two pale transverse lines are just visible, but in some females even these are imperceptible. It is probable that ab. *unicolor* is recessive to the ordinary form with ante- and postmedian lines darker than the ground colour.